COMS W4170
Predicting the Future

Steven Feiner
Department of Computer Science
Columbia University
New York, NY 10027

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Ubiquitous Computing (Ubicomp)

- AKA pervasive computing
- One user: many invisible computers
  - Invisible → “…make a computer so imbedded, so fitting, so natural, that we use it without even thinking about it”
  - Analogy to motors
- E.g., tabs pads boards
  - number: 100s 10s few
  - size: inch- foot- yard-
- Wireless
- Today: iPod nano, iPad, “big” displays

"the age of calm technology, when technology recedes into the background of our lives"
— M. Weiser
Tangible User Interfaces

- “Employ physical objects, surfaces, and spaces as tangible embodiments of digital information.”
  — H. Ishii

Marbles represent phone messages
D. Bishop, Marble Answering Machine concept, 1992

Physical blocks (“phicons”) represent buildings, tools
B. Ullmer and H. Ishii, metaDesk, 1997

Data physicalization
- Jansen et al., CHI 2013

Compared 3D virtual and physical visualizations.
Physical bar charts outperformed virtual ones.
Physical bar charts had the advantage of being “touchable.”
Fingers were used to touch bars as visual and memory aids.

List of Physical Visualizations
http://dataphys.org/list/
Calm Technology
http://www.ubiq.com/hypertext/weiser/calmtech/calmtech.htm

- “Informs but doesn’t demand our focus or attention”
  —M. Weiser & JS Brown, Designing Calm Technology, 1995

- Low bandwidth, low attention
- Ambient displays
  - Blend UI with the environment

N. Jeremijenko, LiveWire, 1995

Apple Knowledge Navigator 1987

- 2011 (as predicted in 1987)
- Bowtied intelligent agent
- Folded display
- Videoconferencing
- Real-time end-user design of animated presentations

**Sun Starfire 1992**

- 2004 (as predicted in 1992)
- Bruce Tognazzini et al.

Sun Starfire, 1992

**Sun Starfire Followup:**
**Talking Head Telepresence**

- High-end commercial video conferencing
  - Projection onto a beamsplitter, as in Starfire
    - http://www.teleportec.com
    - https://www.youtube.com/watch?v=P8-svem0uFo
  - CNN “hologram” (digital compositing of remote participant, captured by a ring of surrounding cameras)
    - Telepresence for home viewers, but not for participants
Sun Starfire Followup: 
Talking Head Telepresence

- USC HeadSPIN system, 2009
  - http://doi.acm.org/10.1145/1597956.1597969
  - http://vimeo.com/5812643
- Remote head scanned in 3D
- Reconstructed head images from many viewpoints are projected onto spinning brushed aluminum anisotropic “mirrors”

Each image is viewable only in a 2.5° volumetric slice in front of the unit, so L and R eyes see different images (stereo) up to 1.5m

Sun Starfire Followup: 
Gestural Interaction

- Oblong g-speak
- Depth/RGB cameras
  - Microsoft Kinect
  - Intel RealSense SDK & camera
  - Google Project Tango
  - ...

http://oblong.com/what-we-do/g-speak
Alternate Versions of the Future(s)

- NTT DoCoMo Vision 2010 (ca. 2000)
  - http://www.youtube.com/watch?v=ae-Ssclu5A4
- NTT DoCoMo Mobile Life Story (2006)
  - http://www.youtube.com/watch?v=eS0P16lyXOw
- HP Labs mscapes “Roku’s Reward” (2007)
  - http://vimeo.com/45472894
  - https://www.youtube.com/watch?v=8Ff7SzP4gfg
  - http://vimeo.com/8569187
- Project Glass: One day
  - https://www.youtube.com/watch?v=9c6W4CCU9M4

And, lots more…

- E.g.,
  - http://www.mprove.de/script/04/chi/conceptclips.html